1210 CALIFORNIA CIRCLE DRAFT AIR QUALITY AND GHG EMISSIONS ASSESSMENT

Milpitas, California

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Project 14-102

Introduction

The purpose of this report is to address air quality and greenhouse gas emission impacts associated with the proposed 1210 California Circle townhome project in Milpitas, California. We understand that the project proposes the construction of up to 148 townhomes (with a maximum up to 170) on a 9.5-acre site. The site is currently occupied with an approximately 125,000 square foot (s.f.) vacant commercial building, which would be demolished. Air quality impacts were analyzed due to temporary construction emissions and as a result of direct and indirect air pollutant and greenhouse gas (GHG) emissions from users of the proposed residences, and impacts of toxic air contaminants (TACs) on future residences. This analysis was conducted following guidance provided by the Bay Area Air Quality Management District (BAAQMD).

Setting

The project is located in the northern portion of the Santa Clara County, which is in the San Francisco Bay Area Air Basin. Ambient air quality standards have been established at both the State and federal level. The Bay Area meets all ambient air quality standards with the exception of ground-level ozone, respirable particulate matter (PM_{10}) and fine particulate matter ($PM_{2.5}$).

High ozone levels are caused by the cumulative emissions of reactive organic gases (ROG) and nitrogen oxides (NOx). These precursor pollutants react under certain meteorological conditions to form high ozone levels. Controlling the emissions of these precursor pollutants is the focus of the Bay Area’s attempts to reduce ozone levels. The highest ozone levels in the Bay Area occur in the eastern and southern inland valleys that are downwind of air pollutant sources. High ozone levels aggravate respiratory and cardiovascular diseases, reduced lung function, and increase coughing and chest discomfort.

Particulate matter is another problematic air pollutant of the Bay Area. Particulate matter is assessed and measured in terms of respirable particulate matter or particles that have a diameter of 10 micrometers or less (PM_{10}) and fine particulate matter where particles have a diameter of 2.5 micrometers or less ($PM_{2.5}$). Elevated concentrations of PM_{10} and $PM_{2.5}$ are the result of both region-wide (or cumulative) emissions and localized emissions. High particulate matter levels aggravate respiratory and cardiovascular diseases, reduce lung function, increase mortality (e.g., lung cancer), and result in reduced lung function growth in children.

Toxic air contaminants (TAC) are a broad class of compounds known to cause morbidity or mortality (usually because they cause cancer) and include, but are not limited to, the criteria air pollutants listed above. TACs are found in ambient air, especially in urban areas, and are caused by industry, agriculture, fuel combustion, and commercial operations (e.g., dry cleaners). TACs are typically found in low concentrations, even near their source (e.g., diesel particulate matter near a freeway). Because chronic exposure can result in adverse health effects, TACs are regulated at the regional, state, and Federal level.

Diesel exhaust is the predominant TAC in urban air and is estimated to represent about three-quarters of the cancer risk from TACs (based on the Bay Area average). According to the CARB, diesel exhaust is a complex mixture of gases, vapors and fine particles. This complexity makes the evaluation of health effects of diesel exhaust a complex scientific issue. Some of the chemicals in diesel exhaust, such as benzene and formaldehyde, have been previously identified as TACs by the CARB, and are listed as carcinogens either under the state's Proposition 65 or under the Federal Hazardous Air Pollutants programs.

CARB has adopted and implemented a number of regulations for stationary and mobile sources to reduce emissions of DPM. Several of these regulatory programs affect medium and heavy duty diesel trucks that represent the bulk of DPM emissions from California highways. These regulations include the solid waste collection vehicle (SWCV) rule, in-use public and utility fleets, and the heavy-duty diesel truck and bus regulations. In 2008, CARB approved a new regulation to reduce emissions of DPM and nitrogen oxides from existing on-road heavy-duty diesel fueled vehicles.[1] The regulation requires affected vehicles to meet specific performance requirements between 2014 and 2023, with all affected diesel vehicles required to have 2010 model-year engines or equivalent by 2023. These requirements are phased in over the compliance period and depend on the model year of the vehicle.

The Bay Area Air Quality Management District (BAAQMD) is the regional agency tasked with managing air quality in the region. At the State level, the California Air Resources Board (a part of the California Environmental Protection Agency) oversees regional air district activities and regulates air quality at the State level. The BAAQMD has published CEQA Air Quality Guidelines that are used in this assessment to evaluate air quality impacts of projects.[2]

Significance Thresholds

In June 2010, BAAQMD adopted thresholds of significance to assist in the review of projects under CEQA. These Thresholds were designed to establish the level at which BAAQMD believed air pollution emissions would cause significant environmental impacts under CEQA and were posted on BAAQMD's website and included in the Air District's updated CEQA Guidelines (updated May 2011). The significance thresholds identified by BAAQMD and used in this analysis are summarized in Table 1.

BAAQMD's adoption of significance thresholds contained in the 2011 CEQA Air Quality Guidelines was called into question by an order issued March 5, 2012, in California Building Industry Association (CBIA) v. BAAQMD (Alameda Superior Court Case No. RGI0548693). The order requires BAAQMD to set aside its approval of the thresholds until it has conducted environmental review under CEQA. The ruling made in the case concerned the environmental impacts of adopting the thresholds and how the thresholds would indirectly affect land use development patterns. In August 2013, the Appellate Court struck down the lower court's order to set aside the thresholds. However, this litigation remains pending as the California Supreme Court recently accepted a portion of CBIA's petition to review the appellate court's decision to uphold BAAQMD's adoption of the thresholds. The specific portion of the argument to be considered is in regard to whether CEQA requires consideration of the effects of the environment on a project (as contrasted to the effects of a proposed project on the environment). Therefore, the significance thresholds contained in the 2011 CEQA Air Quality Guidelines are applied to this project.

[1] Available online: http://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm. Accessed: April 30, 2014.
[2] Bay Area Air Quality Management District. 2011. BAAQMD CEQA Air Quality Guidelines. May.

Table 1. Air Quality Significance Thresholds

Pollutant	Construction Thresholds	Operational Thresholds	
	Average Daily Emissions (lbs./day)	Average Daily Emissions (lbs./day)	Annual Average Emissions (tons/year)
Criteria Air Pollutants			
ROG	54	54	10
NO_x	54	54	10
PM_{10}	82	82	15
$PM_{2.5}$	54	54	10
CO	Not Applicable	9.0 ppm (8-hour average) or 20.0 ppm (1-hour average)	
Fugitive Dust	Construction Dust Ordinance or other Best Management Practices	Not Applicable	
Health Risks and Hazards for New Sources			
Excess Cancer Risk	10 per one million	10 per one million	
Chronic or Acute Hazard Index	1.0	1.0	
Incremental annual average $PM_{2.5}$	0.3 $\mu g/m^3$	0.3 $\mu g/m^3$	
Health Risks and Hazards for Sensitive Receptors (Cumulative from all sources within 1,000 foot zone of influence) and Cumulative Thresholds for New Sources			
Excess Cancer Risk	100 per one million		
Chronic Hazard Index	10.0		
Annual Average $PM_{2.5}$	0.8 $\mu g/m^3$		
Greenhouse Gas Emissions			
GHG Annual Emissions	1,100 metric tons or 4.6 metric tons per capita		
Note: ROG = reactive organic gases, NOx = nitrogen oxides, PM_{10} = course particulate matter or particulates with an aerodynamic diameter of 10 micrometers (µm) or less, $PM_{2.5}$ = fine particulate matter or particulates with an aerodynamic diameter of 2.5µm or less; and GHG = greenhouse gas.			

Impacts and Mitigation Measures

Impact 1: Conflict with or obstruct implementation of the applicable air quality plan? ***Less than significant***

The most recent clean air plan is the *Bay Area 2010 Clean Air Plan* that was adopted by BAAQMD in September 2010. The proposed project would not conflict with the latest Clean Air planning efforts since (1) the project would have emissions well below the BAAQMD thresholds (see Impact 2), (2) development of the project site would be considered urban “infill”, (3) development would occur near employment centers, and (4) development would be near existing transit with regional connections. The project, at 170 units is too small to exceed any of the significance thresholds and, thus, it is not required to incorporate project-specific transportation control measures listed in the latest Clean Air Plan

Impact 2: Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable Federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)? ***Less than significant with construction-period mitigation measures***

The Bay Area is considered a non-attainment area for ground-level ozone and fine particulate matter ($PM_{2.5}$) under both the Federal Clean Air Act and the California Clean Air Act. The area is also considered non-attainment for respirable particulates or particulate matter with a diameter of less than 10 micrometers (PM_{10}) under the California Clean Air Act, but not the Federal act. The area has attained both State and Federal ambient air quality standards for carbon monoxide. As part of an effort to attain and maintain ambient air quality standards for ozone and PM_{10}, the BAAQMD has established thresholds of significance for these air pollutants and their precursors. These thresholds are for ozone precursor pollutants (ROG and NOx), PM_{10} and $PM_{2.5}$ and apply to both construction period and operational period impacts.

The California Emissions Estimator Model (CalEEMod) Version 2013.2.2 was used to predict emissions from construction of the site assuming full build out of the project. The project land use types and size, and trip generation rate were input to CalEEMod.

Construction period emissions

CalEEMod provided annual emissions for construction. CalEEMod provides emission estimates for both on-site and off-site construction activities. On-site activities are primarily made up of construction equipment emissions, while off-site activity includes worker, hauling and vendor traffic. A construction build-out scenario, including equipment list was provided by the project applicant. An equipment list was not available for the building construction and architectural coating phases, so the CalEEMod default was used for these two phases. The project would require approximately 30,000 cubic yards of soil import. The anticipated 125,000 for building demolition and 1,725 tons of pavement demolition were entered into the model. *Attachment 1* includes the CalEEMod input and output values for construction emissions.

The proposed project land use was input into CalEEMod, which was 170 residential units entered as "Condo/Townhouse." While the project currently proposes 148 townhomes we understand that up to 170 could be constructed.

The applicant provided anticipated start date and phase durations for construction of the project. Based on this information, the modeling scenario assumes that the project would be built out over a period of approximately 38 months beginning in April 2015, or an estimated 836 construction workdays (based on an average of 22 workdays per month). Average daily emissions were computed by dividing the total construction emissions by the number of construction days. Table 2 shows average daily construction emissions of ROG, NO_X, PM_{10} exhaust, and $PM_{2.5}$ exhaust during construction of the project. As indicated in Table 2, predicted project emissions would not exceed the BAAQMD significance thresholds.

Construction activities, particularly during site preparation and grading would temporarily generate fugitive dust in the form of PM_{10} and $PM_{2.5}$. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit mud on local streets, which could be an additional source of airborne dust after it dries. Fugitive dust emissions would vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. Fugitive dust emissions would also depend on soil moisture, silt content of soil, wind speed, and the amount of equipment operating. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site. The BAAQMD CEQA Air Quality Guidelines consider these impacts to be less than significant if best management practices are employed to reduce these emissions. *Mitigation Measure 1 would implement BAAQMD-recommended best management practices*.

Table 2. Construction Period Emissions

Scenario	**ROG**	**NOx**	**PM_{10} Exhaust**	**$PM_{2.5}$ Exhaust**
Construction emissions (tons)	2.22 tons	8.46 tons	0.50 tons	0.47 tons
Average daily emissions (pounds)[1]	5.3 lbs.	20.2 lbs.	1.2 lbs.	1.1 lbs.
BAAQMD Thresholds (pounds per day)	*54* lbs.	*54* lbs.	*82* lbs.	*54* lbs.
Exceed Threshold?	**No**	**No**	**No**	**No**
Notes: [1] Assumes 836 workdays.				

<u>Operational Period Emissions</u>

Due to the project size, operational-period emissions would be less than significant. In the 2011 update to the CEQA Air Quality Guidelines, BAAQMD identifies screening criteria for the sizes of land use projects that could result in significant air pollutant emissions. For operational impacts, the screening project size is identified at 451 dwelling units. Townhome projects of smaller size would be expected to have less-than-significant impacts with respect to operational-period emissions. Since the project proposes to develop up to 170 dwelling units, it is concluded that emissions would be below the BAAQMD significance thresholds for the operational period. Stationary sources of air pollution (e.g., back-up generators) have not been identified with this project.

Mitigation Measure 1: Include measures to control dust emissions.

Implementation of the measures recommended by BAAQMD and listed below would reduce the air quality and fugitive dust-related impacts associated with grading and new construction to a less than significant. The contractor shall implement the following Best Management Practices that are required of all projects:

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.

2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.

3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.

4. All vehicle speeds on unpaved roads shall be limited to 15 mph.

5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible and feasible. Building pads shall be laid as soon as possible and feasible, as well, after grading unless seeding or soil binders are used.

6. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.

7. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.

8. Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

Impact 3: Violate any air quality standard or contribute substantially to an existing or projected air quality violation? ***Less than significant***

As discussed under Impact 2, the project would have emissions less than the significance thresholds adopted by BAAQMD for evaluating impacts related to ozone and particulate matter. Therefore, the project would not contribute substantially to existing or projected violations of those standards. Carbon monoxide emissions from traffic generated by the project would be the pollutant of greatest concern at the local level. Congested intersections with a large volume of traffic have the greatest potential to cause high-localized concentrations of carbon monoxide. Air pollutant monitoring data indicate that carbon monoxide levels have been at healthy levels (i.e., below State and federal standards) in the Bay Area since the early 1990s. As a result, the region has been designated as attainment for the standard. There is an ambient air quality monitoring station in San Jose that measures carbon monoxide concentrations. The highest measured level over any 8-hour averaging period during the last 3 years is less than 3.0 parts per million (ppm), compared to the ambient air quality standard of 9.0 ppm. The project would generate a relatively small amount of traffic (less than 100 trips during the busiest hour). Intersections affected by the project would have traffic volumes less than the BAAQMD screening criteria and, thus, would not cause a violation of an ambient air quality standard or have a considerable contribution to cumulative violations of these standards.[3]

Impact 4: Expose sensitive receptors to substantial pollutant concentrations? ***Less than significant with construction period mitigation measures***

Sensitive receptors are locations where an identifiable subset of the general population (children, asthmatics, the elderly, and the chronically ill) that is at greater risk than the general population to the effects of air pollutants are likely to be exposed. These locations include residences, schools, playgrounds, childcare centers, retirement homes, hospitals, and medical clinics. Operation of the project is not expected to cause any localized emissions that could expose sensitive receptors to unhealthy air pollutant levels. Construction activity would generate dust and equipment exhausts on a temporary basis. There are nearby sources of air pollutant emissions, but they are not anticipated to adversely affect new residents. Impacts from project construction and existing sources of air pollution are addressed.

Project Construction Activity

Construction activity is anticipated to involve demolition of the existing on-site buildings, grading, site preparation, trenching, paving, construction, and architectural coating. As discussed under Impact 2, the project would have less-than-significant construction period emissions. While those thresholds primarily address the potential for emission to adversely affect regional air quality, localized emissions of dust or equipment exhaust could affect nearby sensitive land uses. During demolition, grading, site preparation,

[3] For a land-use project type, the BAAQMD CEQA Air Quality Guidelines state that a proposed project would result in a less than significant impact to localized carbon monoxide concentrations if the project would not increase traffic at affected intersections to more than 44,000 vehicles per hour.

and construction activities, dust would be generated. Most of the dust would result during grading activities. The amount of dust generated would be highly variable and is dependent on the size of the area disturbed at any given time, amount of activity, soil conditions and meteorological conditions. Typical winds during late spring through summer are from the northwest. Nearby land uses could be adversely affected by dust generated during construction activities. The BAAQMD CEQA Air Quality Guidelines consider these impacts to be less than significant if best management practices are employed to reduce these emissions. *Mitigation Measure 1 would implement BAAQMD-required best management practices*.

Construction equipment and associated heavy-duty truck traffic generates diesel exhaust, which is a known Toxic Air Contaminant (TAC). As indicated under Impact 3, these emissions would not be considered to contribute substantially to existing or projected air quality violations. The BAAQMD has not developed any procedures or guidelines for identifying these impacts from temporary construction activities where diesel particulate matter emissions are transient. They are typically evaluated for stationary sources (e.g., large compression ignition engines such as generators) in health risk assessments over the course of lifetime exposures (i.e., 24 hours per day over 70 years).

Diesel exhaust poses both a potential health and nuisance impact to nearby receptors. A health risk assessment of the project construction activities was conducted that evaluated potential health effects of sensitive receptors at these nearby residences from construction emissions of diesel particulate matter (DPM).[4] A dispersion model was used to predict the off-site DPM concentrations resulting from project construction so that lifetime cancer risks could be predicted. The closest residences to the project site are located about 250 feet east of the site on the other side of Coyote Creek. Figure 1 shows the project site and sensitive receptor locations (residences) used in the air quality dispersion modeling analysis where potential health impacts were evaluated.

<u>Construction Emissions</u>

The refined health risk assessment focused on modeling on-site construction activity using construction fleet information included in the project design features. For these reasons, construction period emissions were modeled using CalEEMod along with projected construction activity. The number and types of construction equipment and diesel vehicles, along with the anticipated length of their use for different phases of construction were based on site-specific construction activity schedules provided. Construction of the project is expected to occur over a 38-month period beginning in April 2015. The CalEEMod model provided total annual $PM_{2.5}$ exhaust emissions (assumed to be diesel particulate matter) for the off-road construction equipment and for exhaust emissions from on-road vehicles (haul trucks, vendor trucks, and worker vehicles), with total emissions of 0.4514 tons (903 pounds). The on-road emissions are a result of haul truck travel, worker travel, and vendor deliveries during building demolition, grading and construction activities. A trip length of 0.3 miles was used to represent vehicle travel while at or near the construction site. It was assumed that these emissions from on-road vehicles traveling at or near the site would occur at the construction site. Fugitive $PM_{2.5}$ dust emissions were calculated by CalEEMod as 0.1215 tons (243 pounds) for the overall construction period. The project emission calculations and are provided in *Attachment 1*.

<u>Dispersion Modeling</u>

The U.S. EPA ISCST3 dispersion model was used to predict concentrations of DPM and $PM_{2.5}$ concentrations at existing sensitive receptors (residences) in the vicinity of the project site. The ISCST3 dispersion model is a BAAQMD-recommended model for use in modeling analysis of these types of

[4] DPM is identified by California as a toxic air contaminant due to the potential to cause cancer.

emission activities for CEQA projects.[5] The ISCST3 modeling utilized two area sources to represent the on-site construction emissions, one for DPM exhaust emissions and the other for fugitive $PM_{2.5}$ dust emissions. To represent the construction equipment exhaust emissions, an emission release height of six meters was used for the area source. The elevated source height reflects the height of the equipment exhaust pipes and buoyancy of the exhaust plume. For modeling fugitive $PM_{2.5}$ emissions, a near ground level release height of two meters was used for the area source. Emissions from vehicle travel around the project site were included in the modeled area sources. Construction emissions were modeled as occurring daily between 7 a.m. and 4 p.m.

The modeling used a five-year data set (1996 - 2000) of hourly meteorological data from Alviso available from BAAQMD. Annual DPM and $PM_{2.5}$ concentrations from construction activities in 2015 through 2017 were calculated using the model. DPM and $PM_{2.5}$ concentrations were calculated at nearby residential locations at a receptor height of 1.5 meters (4.9 feet). Figure 1 shows the construction area modeled, and locations of nearby residential receptors.

<u>Predicted Cancer Risk and Hazards</u>

The maximum modeled DPM and $PM_{2.5}$ concentrations occurred at a residence east-southeast of the construction site on the opposite side of Coyote Creek. The location of this receptor is identified on Figure 1. Increased cancer risks were calculated using the modeled concentrations and BAAQMD recommended risk assessment methods for both a child exposure (3rd trimester through 2 years of age) and adult exposure.[6] Since the modeling was conducted under the conservative assumption that emissions occurred daily for a full year during each construction year, the default BAAQMD exposure period of 350 days per year was used.[7]

Results of this assessment indicate that for project construction the incremental child cancer risk at the maximally exposed individual (MEI) receptor would be 10.3 in one million and the adult incremental cancer risk would be 0.6 in one million. While the increased cancer risk for an adult exposure would be lower than the BAAQMD significance threshold of a cancer risk of 10 in one million or greater the child exposure would higher than the significance threshold and would be considered a significant impact.

The maximum annual $PM_{2.5}$ concentration was 0.08 micrograms per cubic meter ($\mu g/m^3$) occurring at the same location where maximum cancer risk would occur. This $PM_{2.5}$ concentration is below the BAAQMD threshold of 0.3 $\mu g/m^3$ used to judge the significance of health impacts from $PM_{2.5}$.

Potential non-cancer health effects due to chronic exposure to DPM were also evaluated. The chronic inhalation reference exposure level (REL) for DPM is 5 $\mu g/m^3$. The maximum predicted annual DPM concentration was 0.0662 $\mu g/m^3$, which is much lower than the REL. The Hazard Index (HI), which is the ratio of the annual DPM concentration to the REL, is 0.013. This HI is much lower than the BAAQMD significance criterion of a HI greater than 1.0.

Attachment 2 includes the emission calculations used for the area source modeling and the cancer risk calculations.

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[5] Bay Area Air Quality Management District (BAAQMD), 2012, *Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 3.0.* May.

[6] Bay Area Air Quality Management District (BAAQMD), 2012, *Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 3.0*, May.

[7] Bay Area Air Quality Management District (BAAQMD), 2010, *Air Toxics NSR Program Health Risk Screening Analysis Guidelines*, January.

The project would have a *significant impact* with respect to community risk caused by construction activities.

Mitigation Measure 2: Selection of equipment during construction to minimize emissions. Such equipment selection would include the following:

1. All diesel-powered off-road equipment larger than 50 horsepower and operating at the site for more than two days continuously shall meet U.S. EPA particulate matter emissions standards for Tier 2 engines or equivalent; and
2. Minimize the number of hours that equipment will operate, including the use of idling restrictions.

Effectiveness of Mitigation Measure AQ-1 and AQ-2

Implementation of Mitigation Measure 2 would reduce on-site diesel exhaust emissions by approximately 50 percent. Implementation of Mitigation Measure 1, which are the Best Management Practices recommended by BAAQMD, is considered to reduce exhaust emissions by an additional 5 percent. Emissions associated with implementation of Mitigation Measure 2 were modeled using CalEEMod, however CalEEMod is not set up to account for any additional reductions due to implementation of Mitigation Measure 1, and thus were not taken. Modeled mitigated emissions were then input back into the dispersion model to predict concentration of DPM and annual $PM_{2.5}$. The computed maximum increased child cancer risk with implementation of mitigation measures would be 5.2 in one million. The increased child cancer risk would be reduced to below 10 chances per million. As a result, the project with mitigation measures would have *a less-than-significant* impact with respect to community risk caused by construction activities.

Figure 1 – Project Construction Site, Residential Receptor Locations, and Location of Maximum Cancer Risk

Project Operation

Operation of this residential project is not considered a source of TAC or $PM_{2.5}$ emissions. As a result, the project operation would not cause emissions that expose sensitive receptors to unhealthy air pollutant levels. Because the project would not be a source of TACs, it would not contribute cumulatively to unhealthy exposure to TACs.

The project would include new sensitive receptors. Substantial sources of air pollution can adversely affect sensitive receptors proposed as part of new projects. A review of the area indicates that there is one roadway within 1,000 feet of the site that could adversely affect new residences and one stationary source of air pollution is located near the site. There are thresholds that address both the impact of single and cumulative TAC sources upon projects that include new sensitive receptors.

A review of the area indicates that the proposed project would place new residences near Interstate 880 (I-880), which has over 10,000 average daily vehicle trips per day. In addition, stationary sources are located within 1,000 feet of the project site. The analysis of the stationary sources used screening data provided by BAAQMD to identify the potential cancer risk and $PM_{2.5}$ exposure risks, whereas refined modeling techniques were employed to assess the impact from I-880 traffic.

<u>Refined Highway Community Risk Impacts – Interstate 880</u>

Traffic on high volume roadways is a source of TAC emissions that may adversely affect sensitive receptors in close proximity the roadway. For roadways, BAAQMD has published screening tables and data to determine if roadways with traffic volumes of over 10,000 vehicles per day may have a significant effect on a proposed project. In the vicinity of the project area I-880 has 205,000 average daily trips (ADT), as reported by Caltrans.[8] A refined analysis of the impacts of TAC and $PM_{2.5}$ to new sensitive receptors is necessary to evaluate potential cancer risks and $PM_{2.5}$ concentrations from I-880. A review of the traffic information reported by Caltrans indicates that I-880 traffic includes about 5.7 percent trucks, of which 3.2 percent are considered heavy-duty trucks and 2.5 percent are medium-duty trucks.[9]

This analysis involved the development of DPM, organic TAC, and $PM_{2.5}$ emissions for traffic on I-880 using the CARB EMFAC2011 emission factor model and the traffic mix on I-880 developed from Caltrans traffic data. EMFAC2011 is the most recent version of the CARB motor vehicle emission factor model. DPM emissions are projected to decrease in the future and are reflected in the EMFAC2011 emissions data. CARB regulations require on-road diesel trucks to be retrofitted with particulate matter controls or replaced to meet new 2010 engine standards that have much lower DPM and PM2.5 emissions than prior years. This regulation will substantially reduce these emissions between 2014 and 2023, with the greatest reductions occurring before 2015. While new trucks and buses will meet strict federal standards, this measure is intended to accelerate the rate at which the fleet either turns over so there are more cleaner vehicles on the road, or retrofitted to meet similar standards. With this regulation, older, more polluting trucks would be removed from the roads much quicker.

Emission factors for I-880 traffic were developed for 2018 (first year of occupancy), 2020, and 2025 using the EMFAC2011 model with default model vehicle fleet age distributions for Santa Clara County. The EMFAC2011 results were then adjusted to the traffic volume and mix of diesel-fueled vehicles on I-

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[8] California Department of Transportation. 2013. *2012 Traffic Volumes on the California State Highway System*.
[9] California Department of Transportation. 2013. *2012 Annual Average Daily Truck Traffic on the California State Highway System*

880 reported by Caltrans. Average daily traffic volumes were based on Caltrans data for I-880 for 2012.[10] Traffic volumes were assumed to increase 1% per year. Average hourly traffic distributions for Santa Clara County roadways were developed using the EMFAC model,[11] which were then applied to the average daily traffic volumes to obtain estimated hourly traffic volumes and emissions for I-880.

For all hours of the day, other than during peak a.m. and p.m. periods, an average speed of 65 mph was assumed for all vehicles other than heavy duty trucks which were assumed to travel at a speed of 60 mph. Based on traffic data from the Santa Clara Valley Transportation Authority's 2012 Monitoring and Conformance Report, traffic speeds during the peak a.m. and p.m. periods were identified.[12] For a 2-hour period during the peak a.m. period average travel speeds of 65 mph (60 mph for trucks) and 30 mph were used for northbound and southbound traffic, respectively. For a 2-hour period during the peak p.m. period average travel speeds of 20 mph and 65 mph (60 mph for trucks) were used for northbound and southbound traffic, respectively.

In addition to evaluating health risks from DPM, the BAAQMD recommends evaluating health effects from total organic gases (TOG) emissions from tailpipes of non-diesel vehicles and TOG emissions from evaporative running losses from non-diesel vehicles.[13] Emissions of TOG were calculated for 2018, 2020 and 2025 using the EMFAC2011 model. These TOG emissions were then used in the modeling the organic TACs. TOG emissions from both exhaust and running evaporative loses from gasoline vehicles were calculated using EMFAC2011 default model values for Santa Clara County along with the traffic volumes and vehicle mixes for I-880. The hourly traffic distributions and emission rates used in the analysis are shown in *Attachment 3*.

Dispersion Modeling

Dispersion modeling of roadway TAC and $PM_{2.5}$ emissions was conducted using the CAL3QHCR model, which is recommended by the BAAQMD for this type of analysis.[14] A five-year data set of hourly meteorological data (1996 - 2000) for the Alviso monitoring station obtained from BAAQMD was used in the modeling. Other inputs to the model included road geometry, hourly traffic volumes, and emission factors. North- and south-bound traffic on I-880 within about 1,000 feet of the project site were evaluated with the model. The modeling used receptors located in the residential areas within the project site with receptor heights of 1.5 meters (4.9 feet) and 4.5 meters (14.8 feet) , representative of breathing heights in one- and two-story residential units. Concentrations at greater heights would be less than those near ground level. Figure 2 shows the roadway links and receptor locations used in the modeling.

Computed Cancer Risk and Non-Cancer Health Effects

Using the annual average DPM and TOG concentrations, the individual cancer risks were computed using the most recent methods recommended by BAAQMD.[15] The factors used to compute cancer risk are highly dependent on modeled concentrations, exposure period or duration, and the type of receptor. The exposure level is determined by the modeled concentration; however, it has to be averaged over a representative exposure period. The averaging period is dependent on many factors, but mostly the type of sensitive receptor being evaluated. This assessment conservatively assumed long-term residential

[10] California Department of Transportation. 2013. *2012 Annual Average Daily Truck Traffic on the California State Highway System*
[11] The Burden output from EMFAC2007, CARB's previous version of the EMFAC model, was used for this since the current web-based version of EMFAC2011 does not include Burden type output with hour by hour traffic volume information.
[12] Santa Clara Valley Transportation Authority. *2012 Monitoring and Conformance Report.* May, 2012.
[13] BAAQMD. *Recommended Methods for Screening and Modeling Local Risks and Hazards*. May 2012
[14] BAAQMD. *Recommended Methods for Screening and Modeling Local Risks and Hazards*. May 2012
[15] BAAQMD. *Air Toxics NSR Program Health Risk Screening Analysis (HSRA) Guidelines*, January 2010.

exposures. BAAQMD has developed exposure assumptions for typical types of sensitive receptors. These include nearly continuous exposures of 70 years for residences. It should be noted that the cancer risk calculations for 70-year residential exposures reflect use of BAAQMD's most recent cancer risk calculation method, adopted in January 2010. This method applies BAAQMD recommended Age Sensitivity Factors to the cancer risks for residential exposures, accounting for age sensitivity to toxic air contaminants. Age-sensitivity factors reflect the greater sensitivity of infants and children to cancer causing TACs.

The maximum increased cancer risk was computed as 8.6 in one million. This was modeled at a receptor in the western residential area of the project site closest to I-880, and is shown on Figure 2. Cancer risks at other locations would be lower than the maximum risk. The maximum increased cancer risk is below the BAAQMD's threshold of 10 in one million excess cancer cases per million. *Therefore, this impact would be considered less than significant and no mitigation would be required.*

Potential non-cancer health effects due to chronic exposure to DPM were also evaluated. The chronic inhalation REL for DPM is 5 $\mu g/m^3$. The maximum predicted annual DPM concentration is 0.018 $\mu g/m^3$, which is much lower than the REL. The HI for this concentration is 0.004. This HI is much lower than the BAAQMD significance criterion of a HI greater than 1.0. The modeling results and health risk calculations for the receptor with the maximum cancer risk from I-880 traffic are provided in *Attachment 3*.

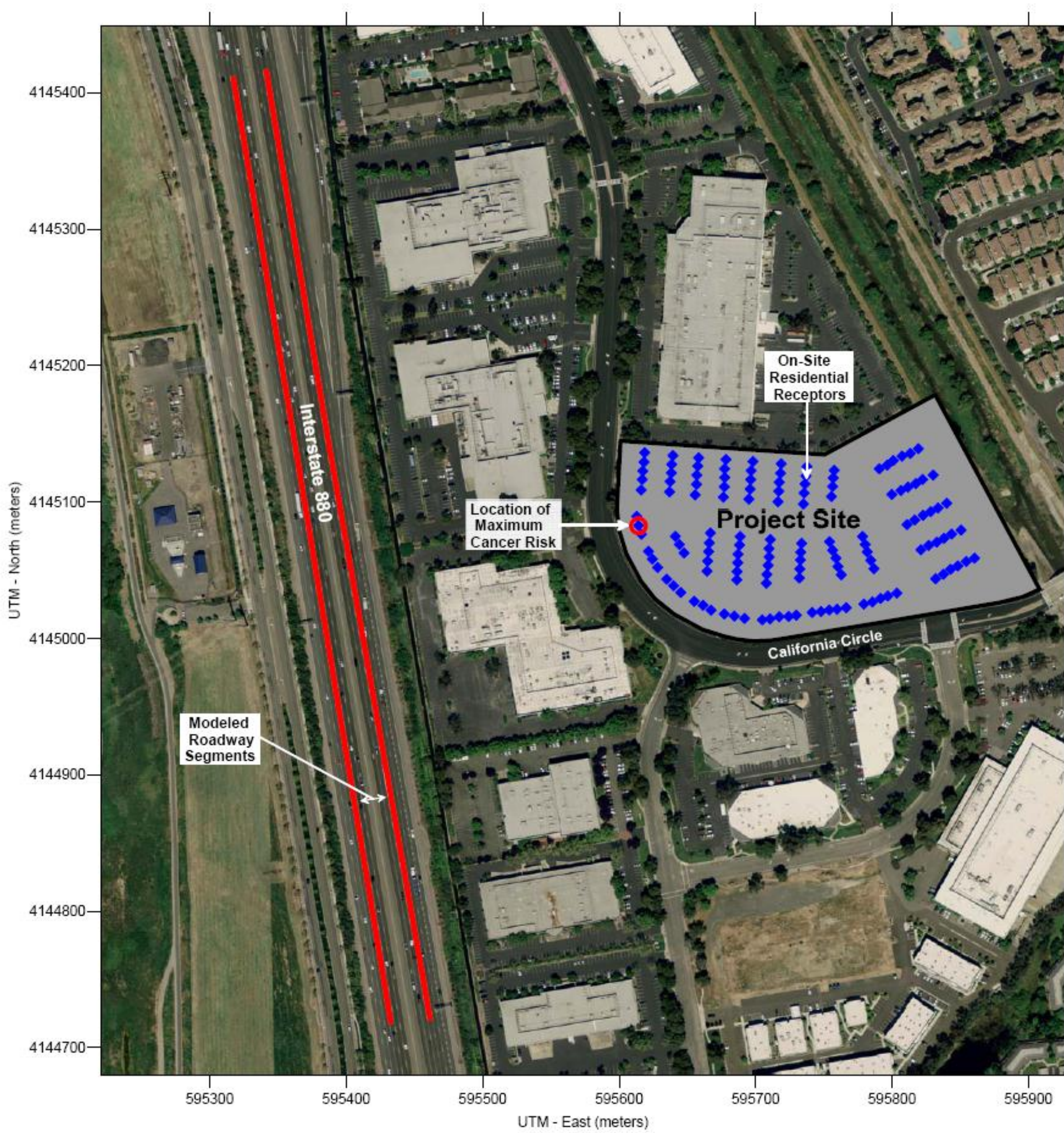
$PM_{2.5}$ Concentrations from Interstate 880

In addition to evaluating the health risks from TACs, potential impacts from $PM_{2.5}$ emissions for vehicles traveling on I-880 were evaluated. $PM_{2.5}$ concentrations were modeled to evaluate the potential impact of chronic exposure to $PM_{2.5}$. To evaluate potential non-cancer health effects due to $PM_{2.5}$, the BAAQMD adopted a significance threshold of an annual average $PM_{2.5}$ concentration greater than 0.3 $\mu g/m^3$.

The same basic modeling approach that was used for assessing TAC impacts was used in the modeling of $PM_{2.5}$ concentrations. $PM_{2.5}$ emissions from all vehicles were used, rather than just the diesel powered vehicles, because all vehicle types (i.e., gasoline and diesel powered) produce $PM_{2.5}$. Additionally, $PM_{2.5}$ emissions from vehicle tire and brake wear were included in these emissions. The assessment involved, first, calculating $PM_{2.5}$ emission rates from traffic traveling on I-880. Then, dispersion modeling using emission factors and traffic volumes was conducted. The dispersion modeling of traffic using the CAL3QHCR model was conducted in the same manner as the TAC modeling. The model provides estimated annual $PM_{2.5}$ concentrations. $PM_{2.5}$ emissions were calculated using the EMFAC2011 model for 2018, 2020, and 2025. Hourly traffic volumes were calculated in the same manner as discussed earlier for the TAC modeling. The emission rate calculations and traffic volumes are shown in *Attachment 3.*

Maximum annual average $PM_{2.5}$ concentrations occurred at the same location that had maximum cancer risk. The maximum average annual concentration from I-880 traffic was 0.16 $\mu g/m^3$. This concentration is below the BAAQMD $PM_{2.5}$ threshold of greater than 0.3 $\mu g/m^3$. *No mitigation would be required.*

Figure 2. Project Site, Roadway Links, and Project Residential Receptor Locations



Impacts from Railroad

There is a Union Pacific rail line located east of the project site that carries up to 30 trains per day, including Amtrak, Capitol Corridor and ACE commuter trains, and freight trains. However, this rail line is located over 1,000 feet from the project site and, therefore, is determined to have a less-than-significant community health risk impact to the site based on BAAQMD guidance.

Impacts from Stationary Sources

Permitted stationary sources of air pollution near the project site were identified using BAAQMD's *Stationary Source Risk & Hazard Analysis Tool*. This mapping tool uses Google Earth to identify the location of stationary sources and their estimated risk and hazard impacts. This tool identified three sources that could affect the project site:

- Plant 19188, which is an emergency back-up generator located at 1210 California Circle formerly operated by Solyndra. This source would be replaced as part of the project and, therefore, would no longer pose any health risk to the project site.
- Plant 15840, which is an emergency back-up generator located at 1421 California Circle operated by LTX-Credence about 550 feet northwest of the project site. At BAAQMD's direction, risk and $PM_{2.5}$ concentrations from a diesel generator was adjusted for distance based on BAAQMD's *Distance Adjustment Multiplier Tool for Diesel Internal Combustion (IC) Engines*. According to BAAQMD (and adjusted for the 550-foot distance), this facility would result in an excess cancer risk of 1.3 per million, $PM_{2.5}$ concentration of <0.01 and HI of <0.01, all of which would be below BAAQMD thresholds of significance.
- Plant 4104, which is an emergency back-up generator located at 505 Fairview Way operated by THAT Corporation. According to BAAQMD, this facility would result in an excess cancer risk of 0.0 per million, $PM_{2.5}$ concentration of 0.01 and HI of <0.01, all of which would be below BAAQMD thresholds of significance.

Cumulative Community Risk Impacts

Based on refined modeling of I-880 and screening data provided by BAAMQD for the nearby generator sources, the combination of exposures would result in excess cancer risks of 9.9 per million, $PM_{2.5}$ exposures of <0.18 $\mu g/m^3$ and a Hazard Index well below 1.0. These exposures are below the cumulative source thresholds of significance identified by BAAQMD (Cumulative Cancer Risk threshold: an excess cancer risk level of more than 100 in one million or a chronic non-cancer hazard index greater than 10.0. Cumulative $PM_{2.5}$ threshold: 0.8 $\mu g/m^3$ annual average $PM_{2.5}$).

Impact 5: Create objectionable odors affecting a substantial number of people? ***Less than significant with mitigation***

The project would generate localized emissions of diesel exhaust during construction equipment operation and truck activity. These emissions may be noticeable from time to time by adjacent receptors. However, they would be localized and are not likely to adversely affect people off site by resulting in confirmed odor complaints.

Typical large non-project sources of odors that result in complaints are wastewater treatment facilities, landfills including composting operations, food processing facilities, and chemical plants. Other sources, such as restaurants, paint or body shops, and coffee roasters typically result in localized sources of odors. The BAAQMD CEQA Air Quality Guidelines identify screening buffers for various odor sources within which significant odor impacts could occur. According to the BAAQMD CEQA Guidelines, an odor source with five or more confirmed complaints per year averaged over three years is considered to have a significant impact. There are several odor sources[16] that have been suspected of causing odor complaints in Milpitas, which are described below:

- Allied Waste – Newby Island Landfill and Compost Facility: This landfill and compost facility is located about one mile west of the City of Milpitas near Dixon Landing Road. Trash collected from Milpitas and other Santa Clara communities is disposed at this site. In addition, the compost facility processes green and food waste. Methane and other gases may be generated as a result of the trash and compost decomposition from these facilities. These facilities are located approximately 1.5 miles from the project site.
- Zanker Road Landfill and Compost Facility: This landfill and compost facility is located about 1.8 miles to the west of Milpitas. Landfilling operations include processing and disposal of nonhazardous, non-compostable, inert mixed wastes, as well as recycling residuals from the on-site resource recovery activities. The landfill composts yard waste by conventional open-window composting. The same company operates the neighboring Zanker Materials Processing Facility, with similar landfill operations. The resource recovery facility processes concrete, demolition debris, wood waste, glass, soil, and yard waste and composting. These facilities are located approximately 2.25 miles from the project site.
- San Jose/Santa Clara Water Pollution Control Plant (WPCP): This facility is located on Zanker Road a mile west of Milpitas. The WPCP treats sewage from Milpitas, San Jose, Santa Clara and other Santa Clara communities. Odors are generated in the sewage treatment and solids handling process. The treatment process first separates solids and liquids. Solids are treated by anaerobic digestion for about 30 days, stored in open air lagoons for 3 to 4 years, and then air dried in open drying beds. Odor controls are in place, including the use of chemicals. The WPCP began a master planning effort in 2008 that is expected to reduce odor complaints. The project site is located approximately 0.3 miles from the nearest WPCP treatment lagoons.
- Calpine Los Esteros Power Plant: This power plant, which may generate odors similar to chemical manufacturing is located approximately 1.5 miles from the project site.
- San Francisco Bay and Creeks: Natural decomposition or organic material occurs in the San Francisco Bay wetlands west of Milpitas. During windy conditions, marsh sediments may be churned and odors released. Such events are more likely to occur during the spring and fall.

Table 3 shows BAAQMD-recommended screening buffers and distances from nearby odor sources to the project. As shown in Table 3, several odor sources are located within the screening distance from the project site. Though the Allied and WPCP sites have best management practices (BMPs) in place, there are still incidences of odor complaints received by the City of Milpitas and BAAQMD. According to the agenda for the most recent Milpitas City Council hearing regarding the odor issue,[17] from April 9 through May 11, 2014, BAAQMD received ten unconfirmed odor complaints originating in Milpitas. Four complaints identified a garbage odor, one complaint identified a sewage odor and five complaints did not identify an odor source. As of the last City Council update, the City's odor reporting website received 23 reported complaints. Though, it does not identify the exact odor source, it is likely that some of the garbage and sewage odor complaints were related to the nearby sources described above and shown in Table 3.

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[16] City of Milpitas, 2008. *City of Milpitas Odor Control Plan, Maintenance-Level Plan*. Revised June.

[17] Milpitas City Council Agenda, Tuesday, June 3, 2014. Available online: http://www.ci.milpitas.ca.gov/_pdfs/council/2014/060314/agenda.pdf. Accessed: July 17, 2014.

In response to the odor issue in Milpitas, the City implemented its odor management plan and installed meteorological stations at the City's sewage pumping station located adjacent to the WPCP and Newby Island, and the City's Public Works Department. These stations help assess odor incidences and the City continues to show a decrease in odor complaints over time.[18] In 2008, the City transitioned to a Maintenance-Level Odor Action Plan with the objective of ensuring that odor generators continue to maintain their BMPs and controls to keep odor incidents as low as practicable. Components of the Maintenance-Level Odor Action Plan include a streamlined complaint process, the rapid notification plan, and setting triggers for and implementing a significant incident response plan. The BAAQMD rapid notification process and staff will continue tracking complaints to ensure that they remain at the currently attained baseline level.

Odors are part of the existing baseline that affect much of the western portion of Milpitas. The geographic area that complaints are received is vast. The odor issue is well documented and is being addressed on an ongoing basis by the City. It is recommended that the City require that future occupants of the project be notified that objectionable odors may be experienced at times and *implementation of Mitigation Measure 3 would reduce this impact to a level of less than significant*. While Mitigation Measure 3 would not remove the odor sources, it would likely reduce the probability that future residences would be surprised should they find odor sources present and, therefore, less likely to complain and result in confirmed cases of odor complaints.

Table 3. BAAQMD Odor Screening Distances

Land Use/Type of Operation	Project Screening Distance	Distance to the Project Site
Wastewater Treatment Plant	2 miles	--
San Jose/Santa Clara WPCP	--	1/3 mile
Wastewater Pumping Facilities	1 mile	
Sanitary Landfill	2 miles	--
Newby Island Landfill and Compost Facility	--	1 ½ miles
Zanker Road Landfill and Compost Facility	--	2 ¼ miles
Transfer Station	1 mile	--
Composting Facility	1 mile	--
Asphalt Batch Plant	2 miles	--
Chemical Manufacturing	2 miles	--
Calpine Los Esteros Power Plant	--	1 ½ miles
Fiberglass Manufacturing	1 mile	--
Painting/Coating Operations	1 mile	--
Coffee Roaster	1 mile	--
Food Processing Facility	1 mile	--
Green Waste and Recycling Operations	1 mile	--

[18] City of Milpitas, 2008, *op. cit.*

Mitigation Measure 3: Future residents of the project shall be notified in writing of possible odor impacts as part of buyer disclosures or lease/rental agreements.

All future residents of the project shall be notified in writing of possible odor impacts as part of buyer disclosures or lease/rental agreements. Included shall be information pertaining to the location and distance of nearby odor sources, BAAQMD screening buffers distances, types of odor that each source may produce, and the best and most recent information about confirmed odor complaints in the project vicinity.

> **Impact 6:** Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment? ***Less than significant***

The BAAQMD May 2011 CEQA Guidelines included GHG emissions-based significance thresholds. These thresholds include a "bright-line" emissions level of 1,100 metric tons per year for land-use type projects and 10,000 metric tons per year for stationary sources. Land use projects with emissions above the 1,100 metric ton per year threshold would then be subject to a GHG efficiency threshold of 4.6 metric tons per year per capita. Projects with emissions above the thresholds would be considered to have an impact, which, cumulatively, would be significant. The project size, 170 condo units, exceeds the screening size listed in the 2011 BAAQMD CEQA Air Quality Guidelines as having less than significant GHG emissions. Therefore, a refined analysis that includes modeling of GHG emissions from the project was conducted.

The CalEEMod model was also used to predict GHG emissions from operation of the site assuming full build-out of the project. The project land use types and size, trip generation rate and other project-specific information were input to the model. The use of this model for evaluating emissions from land use projects is recommended by the BAAQMD. Unless otherwise noted below, the CalEEMod model defaults for Santa Clara County were used. CalEEMod provides emissions for transportation, areas sources, electricity consumption, natural gas combustion, electricity usage associated with water usage and wastewater discharge, and solid waste land filling and transport. CalEEMod output worksheets are included in *Attachment 1*.

Land Use Descriptions
The proposed project land use was input into CalEEMod, which was 170 residential units entered as "Condo/Townhouse."

Trip Generation Rates
Trip generation rates were input to CalEEMod using the daily trip numbers provided in the project traffic report.

Model Year
The model uses mobile emission factors from the California Air Resources Board's EMFAC2011 model. This model is sensitive to the year selected, since vehicle emissions have and continue to be reduced due to fuel efficiency standards and low carbon fuels. The Year 2018 was analyzed since it is the first year that the project could conceivably be occupied.

Energy
Default rates for energy consumption were assumed in the model. Emissions rates associated with electricity consumption were adjusted to account for Pacific Gas & Electric utility's (PG&E) projected 2018 CO_2 intensity rate. This 2018 rate is based, in part, on the requirement of a renewable energy portfolio standard of 33 percent by the year 2020. CalEEMod uses a default rate of 641.35 pounds of

CO_2 per megawatt of electricity produced. The derived 2018 rate for PG&E was estimated at 327.74 pounds of CO_2 per megawatt of electricity delivered and is based on the California Public Utilities Commission (CPUC) GHG Calculator.[19]

Other Inputs
Default model assumptions for GHG emissions associated with area sources, solid waste generation and water/wastewater use were applied to the project. No wood burning from woodstoves or fireplaces was assumed in the modeling however, it was assumed that gas-powered fireplaces could be installed.

Service Population
Project service population is the sum of future residents and full-time employees. The number of future residences was estimated at 575 and was based on the latest US Census data for Milpitas, which shows an average of 3.38 residents per household.[20]

Construction Emissions

GHG emissions associated with construction were computed to be 1,041 MT CO_2e. These are the emissions from on-site operation of construction equipment, hauling truck trips, vendor truck trips, and worker trips. The BAAQMD does not have an adopted Threshold of Significance for construction-related GHG emissions, though total construction period emissions would be less than the BAAQMD operational threshold of 1,100 MT CO_2e per year. The District recommends quantifying emissions and disclosing that GHG emissions would occur during construction. BAAQMD also encourages the incorporation of best management practices to reduce GHG emissions during construction where feasible and applicable. Best management practices assumed to be incorporated into construction of the proposed project include, but are not limited to: using local building materials of at least 10 percent and recycling or reusing at least 50 percent of construction waste or demolition materials.

Operational Emissions

The CalEEMod model, along with the project vehicle trip generation rates, was used to predict daily emissions associated with operation of the fully-developed site under the proposed project. In 2018, annual emissions resulting from the proposed project are predicted to be 1,230 MT of CO_2e. These emissions would exceed the BAAQMD threshold of 1,100 MT of CO_2e/yr. As discussed above, land use projects with emissions above the 1,100 metric ton per year threshold would then be subject to a GHG efficiency threshold of 4.6 metric tons per year per capita to determine impact significance. Computed project per capita emissions are 2.1 MT of CO_2e/year/service population, which would not exceed the BAAQMD threshold of 4.6 MT of CO_2e/year/service population. Table 5 shows predicted project GHG emissions.

Table 5 Annual Project GHG Emissions in Metric Tons

Source Category	2018 Project Emissions
Area	10
Energy Consumption	288
Mobile	871

[19] California Public Utilities Comissions GHG Calculator version 3c, October 7, 2010. Available on-line at: http://ethree.com/public_projects/cpuc2.php. Accessed: July 14, 2014.
[20] United States Census Bureau, 2014. *State & County QuickFacts: Milpitas (city), California*. Available online: http://quickfacts.census.gov/qfd/states/06/0647766.html. Accessed: July 14, 2014.

Solid Waste Generation	36
Water Usage	26
Total	1,231
GHG Per Capita Emissions[1]	2.1
BAAQMD Threshold	4.6 MT CO_2e/year/S.P.

Note: [1]Based on service population of 575.

Impact 7: Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases? ***No Impact.***

In May 2013, the City published its Climate Action Plan[21] with the main goal of reducing GHG emissions through community partnerships and the implementation of GHG reduction measures. The project would be subject to new requirements under rule making developed at the State and local level regarding greenhouse gas emissions and be subject to local policies that may affect emissions of greenhouse gases, such as the City Climate Action Plan.

[21] City of Milpitas, 2013. *Climate Action Plan*. May.

Attachment 1: **CalEEMod Output Worksheets**

Attachment 2: Construction Health Risk Analysis Calculations

1210 Cailfornia Circle, Milpitas, CA

DPM Construction Emissions and Modeling Emission Rates

Construction Year	Activity	DPM (ton/year)	Area Source	DPM Emissions (lb/yr)	DPM Emissions (lb/hr)	DPM Emissions (g/s)	Modeled Area (m^2)	DPM Emission Rate ($g/s/m^2$)
2015	Construction	0.1633	CON_DPM	326.6	0.09942	1.25E-02	37,142	3.37E-07
2016	Construction	0.2417	CON_DPM	483.4	0.14715	1.85E-02	37,142	4.99E-07
2017	Construction	0.0464	CON_DPM	92.9	0.02827	3.56E-03	37,142	9.59E-08
Total		***0.4514***		***903***	***0.2748***	***0.0346***		

Notes:

Emissions assumed to be evenly distributed over each construction areas

hr/day =	9	(7am - 4pm)
days/yr =	365	
hours/year =	3285	

PM2.5 Fugitive Dust Construction Emissions for Modeling

Construction Year	Activity	Area Source	PM2.5 Emissions (ton/year)	PM2.5 Emissions (lb/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (g/s)	Modeled Area (m^2)	PM2.5 Emission Rate $g/s/m^2$
2015	Construction	CON_FUG	0.1199	239.8	0.07300	9.20E-03	37,142	2.48E-07
2016	Construction	CON_FUG	0.0012	2.4	0.00072	9.13E-05	37,142	2.46E-09
2017	Construction	CON_FUG	0.0003	0.6	0.00019	2.45E-05	37,142	6.61E-10
Total			***0.1214***	***242.8***	***0.0739***	***0.0093***		

Notes:

Emissions assumed to be evenly distributed over each construction areas

hr/day =	9	(7am - 4pm)
days/yr =	365	
hours/year =	3285	

1210 Cailfornia Circle, Milpitas, CA

DPM Construction Emissions and Modeling Emission Rates - With Mitigation

Construction Year	Activity	DPM (ton/year)	Area Source	DPM Emissions (lb/yr)	(lb/hr)	(g/s)	Modeled Area (m^2)	DPM Emission Rate ($g/s/m^2$)
2015	Construction	0.0791	CON_DPM	158.2	0.04816	6.07E-03	37,142	1.63E-07
2016	Construction	0.1223	CON_DPM	244.6	0.07446	9.38E-03	37,142	2.53E-07
2017	Construction	0.0267	CON_DPM	53.5	0.01628	2.05E-03	37,142	5.52E-08
Total		***0.2281***		***456***	***0.1389***	***0.0175***		

Notes:

Emissions assumed to be evenly distributed over each construction areas

hr/day =	9	(7am - 4pm)
days/yr =	365	
hours/year =	3285	

PM2.5 Fugitive Dust Construction Emissions for Modeling - With Mitigation

Construction Year	Activity	Area Source	PM2.5 Emissions (ton/year)	(lb/yr)	(lb/hr)	(g/s)	Modeled Area (m^2)	PM2.5 Emission Rate $g/s/m^2$
2015	Construction	CON_FUG	0.0274	54.8	0.01668	2.10E-03	37,142	5.66E-08
2016	Construction	CON_FUG	0.0012	2.4	0.00072	9.13E-05	37,142	2.46E-09
2017	Construction	CON_FUG	0.0003	0.6	0.00019	2.45E-05	37,142	6.61E-10
Total			***0.0289***	***57.8***	***0.0176***	***0.0022***		

Notes:

Emissions assumed to be evenly distributed over each construction areas

hr/day =	9	(7am - 4pm)
days/yr =	365	
hours/year =	3285	

1210 Cailfornia Circle, Milpitas, CA - Construction Health Impact Summary

Construction Year	Maximum Concentrations		Cancer Risk (per million)		Hazard Index	Maximum Annual PM2.5 Concentration
	Exhaust PM2.5/DPM ($\mu g/m^3$)	Fugitive PM2.5 ($\mu g/m^3$)	Child	Adult	(-)	($\mu g/m^3$)
2015	0.0450	0.0339	3.94	0.20	0.009	0.079
2016	0.0662	0.0003	5.80	0.30	0.013	0.067
2017	0.0128	0.0001	0.53	0.06	0.003	0.013
Total	-	-	**10.3**	**0.6**	-	-
Maximum Annual	0.0662	0.0339	-	-	**0.013**	**0.079**

Mitigated Emissions

Construction Year	Maximum Concentrations		Cancer Risk (per million)		Hazard Index	Maximum Annual PM2.5 Concentration
	Exhaust PM2.5/DPM ($\mu g/m^3$)	Fugitive PM2.5 ($\mu g/m^3$)	Child	Adult	(-)	($\mu g/m^3$)
2015	0.0218	0.0077	1.9	0.1	0.004	0.029
2016	0.0338	0.0003	3.0	0.2	0.007	0.034
2017	0.0074	0.0001	0.3	0.0	0.001	0.007
Total	-	-	**5.2**	**0.3**	-	-
Maximum Annual	0.0338	0.0077	-	-	**0.007**	**0.034**

1210 Cailfornia Circle, Milpitas, CA - Construction Impacts - Unmitigated Emissions
Maximum DPM Cancer Risk Calculations From Construction
Off-Site Residential Receptor Locations - 1.5 meters

Cancer Risk (per million) = CPF x Inhalation Dose x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$

Inhalation Dose = C_{air} x DBR x A x EF x ED x 10^{-6} / AT

Where: C_{air} = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
AT = Averaging time period over which exposure is averaged.
10^{-6} = Conversion factor

Values

Parameter	Child	Adult
CPF =	1.10E+00	1.10E+00
DBR =	581	302
A =	1	1
EF =	350	350
AT =	25,550	25,550

Construction Cancer Risk by Year - Maximum Impact Receptor Location

		Child - Exposure Information			Child	Adult - Exposure Information			Adult		
	Exposure			Exposure	Cancer	Modeled		Exposure	Cancer		
Exposure	Duration	DPM Conc (ug/m3)		Adjust	Risk	DPM Conc (ug/m3)		Adjust	Risk	Fugitive	Total
Year	(years)	Year	Annual	Factor	(per million)	Year	Annual	Factor	(per million)	PM2.5	PM2.5
1	1	2015	0.0450	10	3.94	2015	0.0450	1	0.20	0.0339	0.079
2	1	2016	0.0662	10	5.80	2016	0.0662	1	0.30	0.0003	0.067
3	1	2017	0.0128	4.75	0.53	2017	0.0128	1	0.06	0.0001	0.013
4	1	0	0.0000	3	0.00		0.0000	1	0.00		
5	1		0.0000	3	0.00		0.0000	1	0.00		
6	1		0.0000	3	0.00		0.0000	1	0.00		
7	1		0.0000	3	0.00		0.0000	1	0.00		
8	1		0.0000	3	0.00		0.0000	1	0.00		
9	1		0.0000	3	0.00		0.0000	1	0.00		
10	1		0.0000	3	0.00		0.0000	1	0.00		
11	1		0.0000	3	0.00		0.0000	1	0.00		
12	1		0.0000	3	0.00		0.0000	1	0.00		
13	1		0.0000	3	0.00		0.0000	1	0.00		
14	1		0.0000	3	0.00		0.0000	1	0.00		
15	1		0.0000	3	0.00		0.0000	1	0.00		
16	1		0.0000	3	0.00		0.0000	1	0.00		
17	1		0.0000	1.5	0.00		0.0000	1	0.00		
18	1		0.0000	1	0.00		0.0000	1	0.00		
.•	.•	.•	.•	.•	.•	.•	.•	.•	.•		
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65	1		0.0000	1	0.00		0.0000	1	0.00		
66	1		0.0000	1	0.00		0.0000	1	0.00		
67	1		0.0000	1	0.00		0.0000	1	0.00		
68	1		0.0000	1	0.00		0.0000	1	0.00		
69	1		0.0000	1	0.00		0.0000	1	0.00		
70	1		0.0000	1	0.00		0.0000	1	0.00		
Total Increased Cancer Risk					**10.27**				**0.56**		

1210 Cailfornia Circle, Milpitas, CA - Construction Impacts - Mitigated Emissions
Maximum DPM Cancer Risk Calculations From Construction
Off-Site Residential Receptor Locations - 1.5 meters

Cancer Risk (per million) = CPF x Inhalation Dose x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$

Inhalation Dose = C_{air} x DBR x A x EF x ED x 10^{-6} / AT

Where: C_{air} = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
AT = Averaging time period over which exposure is averaged.
10^{-6} = Conversion factor

Values

Parameter	Child	Adult
CPF =	1.10E+00	1.10E+00
DBR =	581	302
A =	1	1
EF =	350	350
AT =	25,550	25,550

Construction Cancer Risk by Year - Maximum Impact Receptor Location

		Child - Exposure Information			Child	Adult - Exposure Information			Adult		
	Exposure			Exposure	Cancer	Modeled		Exposure	Cancer	Mitigated	
Exposure	Duration	DPM Conc (ug/m3)		Adjust	Risk	DPM Conc (ug/m3)		Adjust	Risk	Fugitive	Total
Year	(years)	Year	Annual	Factor	(per million)	Year	Annual	Factor	(per million)	PM2.5	PM2.5
1	1	2015	0.0218	10	1.91	2015	0.0218	1	0.10	0.0077	0.029
2	1	2016	0.0338	10	2.96	2016	0.0338	1	0.15	0.0003	0.034
3	1	2017	0.0074	4.75	0.31	2017	0.0074	1	0.03	0.0001	0.007
4	1		0.0000	3	0.00		0.0000	1	0.00		
5	1		0.0000	3	0.00		0.0000	1	0.00		
6	1		0.0000	3	0.00		0.0000	1	0.00		
7	1		0.0000	3	0.00		0.0000	1	0.00		
8	1		0.0000	3	0.00		0.0000	1	0.00		
9	1		0.0000	3	0.00		0.0000	1	0.00		
10	1		0.0000	3	0.00		0.0000	1	0.00		
11	1		0.0000	3	0.00		0.0000	1	0.00		
12	1		0.0000	3	0.00		0.0000	1	0.00		
13	1		0.0000	3	0.00		0.0000	1	0.00		
14	1		0.0000	3	0.00		0.0000	1	0.00		
15	1		0.0000	3	0.00		0.0000	1	0.00		
16	1		0.0000	3	0.00		0.0000	1	0.00		
17	1		0.0000	1.5	0.00		0.0000	1	0.00		
18	1		0.0000	1	0.00		0.0000	1	0.00		
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮		
65	1		0.0000	1	0.00		0.0000	1	0.00		
66	1		0.0000	1	0.00		0.0000	1	0.00		
67	1		0.0000	1	0.00		0.0000	1	0.00		
68	1		0.0000	1	0.00		0.0000	1	0.00		
69	1		0.0000	1	0.00		0.0000	1	0.00		
70	1		0.0000	1	0.00		0.0000	1	0.00		
Total Increased Cancer Risk					**5.17**				**0.29**		

Attachment 3: I-880 TAC Information and Modeling Calculations

1210 California Circle, Milpitas, CA
Interstate 880 Traffic Data and PM2.5 & TOG Emission Factors - 65 mph & 60 mph for Trucks

Analysis Year = *2018*

						Emission Factors				
						Diesel	All Vehicles		Gas Vehicles	
Vehicle Type	2012 Caltrans Number Vehicles (veh/day)	2018 Number Vehicles (veh/day)	2018 Percent Diesel	Number Diesel Vehicles (veh/day)	Vehicle Speed (mph)	Vehicles DPM (g/VMT)	Total PM2.5 (g/VMT)	Exhaust PM2.5 (g/VMT)	Exhaust TOG (g/VMT)	Running TOG (g/VMT)
LDA	134,014	142,055	0.33%	473	65	0.0150	0.0192	0.0015	0.0255	0.049
LDT	59,301	62,859	0.07%	45	65	0.0228	0.0195	0.0018	0.0426	0.114
MDT	5,153	5,462	6.47%	354	60	0.0212	0.0219	0.0029	0.0584	0.165
HDT	6,532	6,924	88.79%	6,148	60	0.0945	0.1236	0.0808	0.1118	0.138
Total	205,000	217,300	-	7,019	62.5	-	-		-	-
Mix Avg Emission Factor						**0.08500**	**0.02269**	**0.00412**	**0.03169**	**0.07145**
Increase From 2012		1.06								
Vehicles/Direction		108,650		3,510						
Avg Vehicles/Hour/Direction		**4,527**		**146**						

Traffic Data Year = *2012*

Caltrans 2012 Truck AADT Data		Total	Truck by Axle			
	Total	Truck	2	3	4	5
I-880, A Jct Rte 237	205,000	11,685	5,153	2,162	526	3,844
			44.10%	18.50%	4.50%	32.90%
Percent of Total Vehicles		5.70%	2.51%	1.05%	0.26%	1.88%

Traffic Increase per Year (%) = ***1.00%***

1210 California Circle, Milpitas, CA
Interstate 880 Traffic Data and PM2.5 & TOG Emission Factors - 30 mph

Analysis Year = *2018*

						Emission Factors				
						Diesel	All Vehicles		Gas Vehicles	
Vehicle Type	2012 Caltrans Number Vehicles (veh/day)	2018 Number Vehicles (veh/day)	2018 Percent Diesel	Number Diesel Vehicles (veh/day)	Vehicle Speed (mph)	Vehicles DPM (g/VMT)	Total PM2.5 (g/VMT)	Exhaust PM2.5 (g/VMT)	Exhaust TOG (g/VMT)	Running TOG (g/VMT)
LDA	134,014	142,055	0.33%	473	30	0.0208	0.0196	0.0019	0.0318	0.049
LDT	59,301	62,859	0.07%	45	30	0.0344	0.0201	0.0023	0.0550	0.114
MDT	5,153	5,462	6.47%	354	30	0.0346	0.0222	0.0032	0.0915	0.165
HDT	6,532	6,924	88.79%	6,148	30	0.0769	0.1104	0.0676	0.5096	0.138
Total	205,000	217,300	-	7,019	30	-	-		-	-
Mix Avg Emission Factor						**0.07068**	**0.02271**	**0.00413**	**0.04195**	**0.07145**

1210 California Circle, Milpitas, CA
Interstate 880 Traffic Data and PM2.5 & TOG Emission Factors - 20 mph

Analysis Year = *2018*

						Emission Factors				
						Diesel	All Vehicles		Gas Vehicles	
Vehicle Type	2012 Caltrans Number Vehicles (veh/day)	2018 Number Vehicles (veh/day)	2018 Percent Diesel	Number Diesel Vehicles (veh/day)	Vehicle Speed (mph)	Vehicles DPM (g/VMT)	Total PM2.5 (g/VMT)	Exhaust PM2.5 (g/VMT)	Exhaust TOG (g/VMT)	Running TOG (g/VMT)
LDA	134,014	142,055	0.33%	473	20	0.0294	0.0209	0.0032	0.0535	0.049
LDT	59,301	62,859	0.07%	45	20	0.0488	0.0217	0.0040	0.0914	0.114
MDT	5,153	5,462	6.47%	354	20	0.0498	0.0304	0.0114	0.1769	0.165
HDT	6,532	6,924	88.79%	6,148	20	0.0831	0.1170	0.0743	0.7391	0.138
Total	205,000	217,300	-	7,019	20	-	-	-	-	-
Mix Avg Emission Factor						**0.07759**	**0.02444**	**0.00587**	**0.07036**	**0.07145**

1210 California Circle, Milpitas, CA
Interstate 880
DPM Modeling - Roadway Links, Traffic Volumes, and DPM Emissions
Year = 2018

Road Link	Description	Direction	No. Lanes	Link Length (m)	Link Width (ft)	Link Width (m)	Release Height (m)	Diesel ADT	Average Speed (mph)
NB-880	Northbound I-880	N	5	704	79.7	24.3	0.0	3,510	Variable
SB-880	Southbound I-880	S	6	701	91.7	27.9	0.0	3,510	Variable

2018 Hourly Diesel Traffic Volumes Per Direction and DPM Emissions - NB-880

Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile
1	3.51%	123	0.0879	9	6.37%	223	0.0851	17	5.73%	201	0.0779
2	1.96%	69	0.0786	10	7.38%	259	0.0867	18	3.04%	107	0.0712
3	2.00%	70	0.0729	11	6.46%	227	0.0856	19	2.41%	85	0.0724
4	3.45%	121	0.0930	12	6.96%	244	0.0861	20	1.19%	42	0.0605
5	2.03%	71	0.0877	13	6.29%	221	0.0866	21	3.20%	112	0.0794
6	3.57%	125	0.0943	14	6.22%	218	0.0859	22	4.45%	156	0.0844
7	6.64%	233	0.0893	15	5.34%	187	0.0856	23	2.17%	76	0.0876
8	4.93%	173	0.0855	16	3.95%	139	0.0820	24	0.75%	26	0.0868
								Total		3,510	

2018 Hourly Diesel Traffic Volumes Per Direction and DPM Emissions - SB-880

Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile
1	3.51%	123	0.0879	9	6.37%	223	0.0708	17	5.73%	201	0.0859
2	1.96%	69	0.0786	10	7.38%	259	0.0867	18	3.04%	107	0.0737
3	2.00%	70	0.0729	11	6.46%	227	0.0856	19	2.41%	85	0.0724
4	3.45%	121	0.0930	12	6.96%	244	0.0861	20	1.19%	42	0.0605
5	2.03%	71	0.0877	13	6.29%	221	0.0866	21	3.20%	112	0.0794
6	3.57%	125	0.0943	14	6.22%	218	0.0859	22	4.45%	156	0.0844
7	6.64%	233	0.0893	15	5.34%	187	0.0856	23	2.17%	76	0.0876
8	4.93%	173	0.0708	16	3.95%	139	0.0820	24	0.75%	26	0.0868
								Total		3,510	

1210 California Circle, Milpitas, CA
Interstate 880
PM2.5 & TOG Modeling - Roadway Links, Traffic Volumes, and PM2.5 Emissions
Year = 2018

Road Link	Description	Direction	No. Lanes	Link Length (m)	Link Width (ft)	Link Width (m)	Release Height (m)	ADT	Average Speed (mph)
NB-880	Northbound I-880	N	5	704	80	24.3	0.0	108,650	Variable
SB-880	Southbound I-880	S	6	701	92	27.9	0.0	108,650	Variable

2018 Hourly Traffic Volumes Per Direction and PM2.5 Emissions - NB-880

Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile
1	1.14%	1234	0.0288	9	7.09%	7707	0.0231	17	7.35%	7990	0.0237
2	0.39%	422	0.0327	10	4.35%	4729	0.0257	18	8.20%	8906	0.0228
3	0.33%	360	0.0346	11	4.64%	5040	0.0240	19	5.73%	6227	0.0208
4	0.25%	276	0.0624	12	5.88%	6388	0.0237	20	4.30%	4676	0.0205
5	0.48%	522	0.0318	13	6.16%	6698	0.0226	21	3.27%	3556	0.0220
6	0.89%	966	0.0346	14	6.04%	6558	0.0228	22	3.32%	3603	0.0231
7	3.82%	4149	0.0248	15	7.04%	7652	0.0219	23	2.46%	2677	0.0220
8	7.83%	8504	0.0212	16	7.16%	7780	0.0212	24	1.87%	2032	0.0205
								Total		108,650	

2018 Hourly Traffic Volumes Per Direction and PM2.5 Emissions - SB-880

Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile
1	1.14%	1234	0.0288	9	7.09%	7707	0.0230	17	7.35%	7990	0.0218
2	0.39%	422	0.0327	10	4.35%	4729	0.0257	18	8.20%	8906	0.0209
3	0.33%	360	0.0346	11	4.64%	5040	0.0240	19	5.73%	6227	0.0208
4	0.25%	276	0.0624	12	5.88%	6388	0.0237	20	4.30%	4676	0.0205
5	0.48%	522	0.0318	13	6.16%	6698	0.0226	21	3.27%	3556	0.0220
6	0.89%	966	0.0346	14	6.04%	6558	0.0228	22	3.32%	3603	0.0231
7	3.82%	4149	0.0248	15	7.04%	7652	0.0219	23	2.46%	2677	0.0220
8	7.83%	8504	0.0214	16	7.16%	7780	0.0212	24	1.87%	2032	0.0205
								Total		108,650	

1210 California Circle, Milpitas, CA
Interstate 880 Traffic Data and PM2.5 & TOG Emission Factors - 65 mph & 60 mph for Trucks

Analysis Year = ***2020***

						Emission Factors				
						Diesel	All Vehicles		Gas Vehicles	
Vehicle Type	2012 Caltrans Number Vehicles (veh/day)	2020 Number Vehicles (veh/day)	2020 Percent Diesel	Number Diesel Vehicles (veh/day)	Vehicle Speed (mph)	Vehicles DPM (g/VMT)	Total PM2.5 (g/VMT)	Exhaust PM2.5 (g/VMT)	Exhaust TOG (g/VMT)	Running TOG (g/VMT)
LDA	134,055	144,779	0.33%	480	65	0.0121	0.0192	0.0015	0.0202	0.044
LDT	59,260	64,001	0.07%	46	65	0.0188	0.0195	0.0017	0.0333	0.103
MDT	5,153	5,565	6.48%	360	60	0.0190	0.0217	0.0027	0.0498	0.161
HDT	6,532	7,054	88.92%	6,273	60	0.0797	0.1107	0.0682	0.0864	0.115
Total	205,000	221,400	-	7,159	62.5	-	-		-	-
Mix Avg Emission Factor						**0.07176**	**0.02226**	**0.00369**	**0.02505**	**0.06463**
Increase From 2012		1.08								
Vehicles/Direction		110,700		3,580						
Avg Vehicles/Hour/Direction		**4,613**		**149**						

Traffic Data Year = *2012*

Caltrans 2012 Truck AADT Data	Total	Total Truck	Truck by Axle 2	3	4	5
I-880, A Jct Rte 237	205,000	11,685	5,153	2,162	526	3,844
			44.10%	18.50%	4.50%	32.90%
Percent of Total Vehicles		5.70%	2.51%	1.05%	0.26%	1.88%

Traffic Increase per Year (%) = ***1.00%***

1210 California Circle, Milpitas, CA
Interstate 880 Traffic Data and PM2.5 & TOG Emission Factors - 30 mph

Analysis Year = ***2020***

						Emission Factors				
						Diesel	All Vehicles		Gas Vehicles	
Vehicle Type	2012 Caltrans Number Vehicles (veh/day)	2020 Number Vehicles (veh/day)	2020 Percent Diesel	Number Diesel Vehicles (veh/day)	Vehicle Speed (mph)	Vehicles DPM (g/VMT)	Total PM2.5 (g/VMT)	Exhaust PM2.5 (g/VMT)	Exhaust TOG (g/VMT)	Running TOG (g/VMT)
LDA	134,055	144,779	0.33%	480	30	0.0152	0.0196	0.0019	0.0259	0.044
LDT	59,260	64,001	0.07%	46	30	0.0270	0.0200	0.0022	0.0440	0.103
MDT	5,153	5,565	6.48%	360	30	0.0311	0.0220	0.0030	0.0783	0.161
HDT	6,532	7,054	88.92%	6,273	30	0.0692	0.1035	0.0610	0.4439	0.115
Total	205,000	221,400	-	7,159	30	-	-		-	-
Mix Avg Emission Factor						**0.06343**	**0.02246**	**0.00389**	**0.03406**	**0.06463**

1210 California Circle, Milpitas, CA
Interstate 880 Traffic Data and PM2.5 & TOG Emission Factors - 20 mph

Analysis Year = ***2020***

						Emission Factors				
						Diesel	All Vehicles		Gas Vehicles	
Vehicle Type	2012 Caltrans Number Vehicles (veh/day)	2020 Number Vehicles (veh/day)	2020 Percent Diesel	Number Diesel Vehicles (veh/day)	Vehicle Speed (mph)	Vehicles DPM (g/VMT)	Total PM2.5 (g/VMT)	Exhaust PM2.5 (g/VMT)	Exhaust TOG (g/VMT)	Running TOG (g/VMT)
LDA	134,055	144,779	0.33%	480	20	0.0214	0.0209	0.0032	0.0440	0.044
LDT	59,260	64,001	0.07%	46	20	0.0383	0.0216	0.0038	0.0739	0.103
MDT	5,153	5,565	6.48%	360	20	0.0448	0.0292	0.0102	0.1459	0.161
HDT	6,532	7,054	88.92%	6,273	20	0.0716	0.1066	0.0641	0.6270	0.115
Total	205,000	221,400	-	7,159	20	-	-	-	-	-
Mix Avg Emission Factor						**0.06667**	**0.02406**	**0.00549**	**0.05754**	**0.06463**

1210 California Circle, Milpitas, CA
Interstate 880
DPM Modeling - Roadway Links, Traffic Volumes, and DPM Emissions
Year = 2020

Road Link	Description	Direction	No. Lanes	Link Length (m)	Link Width (ft)	Link Width (m)	Release Height (m)	Diesel ADT	Average Speed (mph)
NB-880	Northbound I-880	N	5	704	79.7	24.3	0.0	3,580	Variable
SB-880	Southbound I-880	S	6	701	91.7	27.9	0.0	3,580	Variable

2020 Hourly Diesel Traffic Volumes Per Direction and DPM Emissions - NB-880

Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile
1	3.58%	128	0.0744	9	6.56%	235	0.0705	17	5.83%	209	0.0659
2	1.95%	70	0.0660	10	6.92%	248	0.0769	18	3.14%	113	0.0591
3	1.99%	71	0.0614	11	6.57%	235	0.0710	19	2.52%	90	0.0583
4	3.46%	124	0.0785	12	7.13%	255	0.0716	20	1.32%	47	0.0467
5	2.00%	72	0.0741	13	6.46%	231	0.0718	21	2.81%	101	0.0752
6	3.51%	126	0.0797	14	6.39%	229	0.0713	22	4.03%	144	0.0773
7	6.25%	224	0.0795	15	5.46%	196	0.0707	23	2.13%	76	0.0741
8	5.09%	182	0.0702	16	4.16%	149	0.0676	24	0.75%	27	0.0731
								Total		3,580	

2020 Hourly Diesel Traffic Volumes Per Direction and DPM Emissions - SB-880

Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile
1	3.58%	128	0.0744	9	6.56%	235	0.0624	17	5.83%	209	0.0713
2	1.95%	70	0.0660	10	6.92%	248	0.0769	18	3.14%	113	0.0598
3	1.99%	71	0.0614	11	6.57%	235	0.0710	19	2.52%	90	0.0583
4	3.46%	124	0.0785	12	7.13%	255	0.0716	20	1.32%	47	0.0467
5	2.00%	72	0.0741	13	6.46%	231	0.0718	21	2.81%	101	0.0752
6	3.51%	126	0.0797	14	6.39%	229	0.0713	22	4.03%	144	0.0773
7	6.25%	224	0.0795	15	5.46%	196	0.0707	23	2.13%	76	0.0741
8	5.09%	182	0.0619	16	4.16%	149	0.0676	24	0.75%	27	0.0731
								Total		3,580	

1210 California Circle, Milpitas, CA
Interstate 880
PM2.5 & TOG Modeling - Roadway Links, Traffic Volumes, and PM2.5 Emissions
Year = 2020

Road Link	Description	Direction	No. Lanes	Link Length (m)	Link Width (ft)	Link Width (m)	Release Height (m)	ADT	Average Speed (mph)
NB-880	Northbound I-880	N	5	704	80	24.3	0.0	110,700	Variable
SB-880	Southbound I-880	S	6	701	92	27.9	0.0	110,700	Variable

2020 Hourly Traffic Volumes Per Direction and PM2.5 Emissions - NB-880

Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile
1	1.13%	1256	0.0278	9	7.09%	7854	0.0226	17	7.35%	8139	0.0234
2	0.39%	433	0.0312	10	4.35%	4817	0.0249	18	8.20%	9076	0.0226
3	0.33%	365	0.0326	11	4.64%	5133	0.0233	19	5.73%	6345	0.0206
4	0.25%	279	0.0574	12	5.88%	6511	0.0231	20	4.31%	4767	0.0203
5	0.48%	531	0.0301	13	6.17%	6829	0.0222	21	3.27%	3622	0.0216
6	0.89%	982	0.0327	14	6.03%	6680	0.0223	22	3.31%	3670	0.0227
7	3.82%	4226	0.0241	15	7.05%	7799	0.0216	23	2.46%	2724	0.0216
8	7.83%	8667	0.0209	16	7.16%	7925	0.0210	24	1.87%	2070	0.0204
								Total		110,700	

2020 Hourly Traffic Volumes Per Direction and PM2.5 Emissions - SB-880

Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile
1	1.13%	1256	0.0278	9	7.09%	7854	0.0228	17	7.35%	8139	0.0215
2	0.39%	433	0.0312	10	4.35%	4817	0.0249	18	8.20%	9076	0.0207
3	0.33%	365	0.0326	11	4.64%	5133	0.0233	19	5.73%	6345	0.0206
4	0.25%	279	0.0574	12	5.88%	6511	0.0231	20	4.31%	4767	0.0203
5	0.48%	531	0.0301	13	6.17%	6829	0.0222	21	3.27%	3622	0.0216
6	0.89%	982	0.0327	14	6.03%	6680	0.0223	22	3.31%	3670	0.0227
7	3.82%	4226	0.0241	15	7.05%	7799	0.0216	23	2.46%	2724	0.0216
8	7.83%	8667	0.0212	16	7.16%	7925	0.0210	24	1.87%	2070	0.0204
								Total		110,700	

1210 California Circle, Milpitas, CA
Interstate 880 Traffic Data and PM2.5 & TOG Emission Factors - 65 mph & 60 mph for Trucks

Analysis Year = ***2025***

						Emission Factors				
						Diesel	All Vehicles		Gas Vehicles	
Vehicle Type	2012 Caltrans Number Vehicles (veh/day)	2025 Number Vehicles (veh/day)	2025 Percent Diesel	Number Diesel Vehicles (veh/day)	Vehicle Speed (mph)	Vehicles DPM (g/VMT)	Total PM2.5 (g/VMT)	Exhaust PM2.5 (g/VMT)	Exhaust TOG (g/VMT)	Running TOG (g/VMT)
LDA	134,093	151,525	0.33%	497	65	0.0080	0.0193	0.0016	0.0162	0.037
LDT	59,222	66,921	0.07%	47	65	0.0132	0.0194	0.0017	0.0245	0.086
MDT	5,153	5,823	6.54%	381	60	0.0148	0.0213	0.0023	0.0329	0.145
HDT	6,532	7,381	89.77%	6,626	60	0.0687	0.1016	0.0593	0.0402	0.108
Total	205,000	231,650	-	7,551	62.5	-	-		-	-
Mix Avg Emission Factor						**0.06161**	**0.02202**	**0.00346**	**0.01914**	**0.05440**
Increase From 2012		1.13								
Vehicles/Direction		115,825		3,775						
Avg Vehicles/Hour/Direction		**4,826**		**157**						

Traffic Data Year = *2012*

Caltrans 2012 Truck AADT Data		Total	Truck by Axle			
	Total	Truck	2	3	4	5
I-880, A Jct Rte 237	205,000	11,685	5,153	2,162	526	3,844
			44.10%	18.50%	4.50%	32.90%
Percent of Total Vehicles		5.70%	2.51%	1.05%	0.26%	1.88%

Traffic Increase per Year (%) = ***1.00%***

1210 California Circle, Milpitas, CA
Interstate 880 Traffic Data and PM2.5 & TOG Emission Factors - 30 mph

Analysis Year = ***2025***

						Emission Factors				
						Diesel	All Vehicles		Gas Vehicles	
Vehicle Type	2012 Caltrans Number Vehicles (veh/day)	2025 Number Vehicles (veh/day)	2025 Percent Diesel	Number Diesel Vehicles (veh/day)	Vehicle Speed (mph)	Vehicles DPM (g/VMT)	Total PM2.5 (g/VMT)	Exhaust PM2.5 (g/VMT)	Exhaust TOG (g/VMT)	Running TOG (g/VMT)
LDA	134,093	151,525	0.33%	497	30	0.0072	0.0198	0.0020	0.0210	0.037
LDT	59,222	66,921	0.07%	47	30	0.0162	0.0199	0.0022	0.0324	0.086
MDT	5,153	5,823	6.54%	381	30	0.0241	0.0217	0.0027	0.0525	0.145
HDT	6,532	7,381	89.77%	6,626	30	0.0621	0.0975	0.0552	0.2138	0.108
Total	205,000	231,650	-	7,551	30	-	-		-	-
Mix Avg Emission Factor						**0.05630**	**0.02234**	**0.00377**	**0.02583**	**0.05440**

1210 California Circle, Milpitas, CA
Interstate 880 Traffic Data and PM2.5 & TOG Emission Factors - 20 mph

Analysis Year = ***2025***

						Emission Factors				
						Diesel	All Vehicles		Gas Vehicles	
Vehicle Type	2012 Caltrans Number Vehicles (veh/day)	2025 Number Vehicles (veh/day)	2025 Percent Diesel	Number Diesel Vehicles (veh/day)	Vehicle Speed (mph)	Vehicles DPM (g/VMT)	Total PM2.5 (g/VMT)	Exhaust PM2.5 (g/VMT)	Exhaust TOG (g/VMT)	Running TOG (g/VMT)
LDA	134,093	151,525	0.33%	497	20	0.0101	0.0212	0.0035	0.0361	0.037
LDT	59,222	66,921	0.07%	47	20	0.0229	0.0215	0.0038	0.0552	0.086
MDT	5,153	5,823	6.54%	381	20	0.0350	0.0270	0.0080	0.0847	0.145
HDT	6,532	7,381	89.77%	6,626	20	0.0624	0.0985	0.0562	0.2950	0.108
Total	205,000	231,650	-	7,551	20	-	-	-	-	-
Mix Avg Emission Factor						**0.05738**	**0.02391**	**0.00535**	**0.04386**	**0.05440**

1210 California Circle, Milpitas, CA
Interstate 880
DPM Modeling - Roadway Links, Traffic Volumes, and DPM Emissions
Year = 2025

Road Link	Description	Direction	No. Lanes	Link Length (m)	Link Width (ft)	Link Width (m)	Release Height (m)	Diesel ADT	Average Speed (mph)
NB-880	Northbound I-880	N	5	704	79.7	24.3	0.0	3,775	Variable
SB-880	Southbound I-880	S	6	701	91.7	27.9	0.0	3,775	Variable

2025 Hourly Diesel Traffic Volumes Per Direction and DPM Emissions - NB-880

Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile
1	3.54%	134	0.0640	9	6.47%	244	0.0613	17	5.85%	221	0.0572
2	1.97%	74	0.0567	10	7.27%	275	0.0643	18	3.04%	115	0.0506
3	1.95%	73	0.0523	11	6.25%	236	0.0637	19	2.40%	91	0.0504
4	3.30%	125	0.0676	12	7.04%	266	0.0621	20	0.97%	37	0.0491
5	1.94%	73	0.0638	13	6.54%	247	0.0623	21	3.04%	115	0.0601
6	3.47%	131	0.0687	14	6.41%	242	0.0618	22	4.21%	159	0.0633
7	6.38%	241	0.0662	15	5.47%	207	0.0617	23	2.51%	95	0.0583
8	4.92%	186	0.0612	16	4.04%	153	0.0587	24	0.99%	37	0.0483
								Total		3,775	

2025 Hourly Diesel Traffic Volumes Per Direction and DPM Emissions - SB-880

Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile
1	3.54%	134	0.0640	9	6.47%	244	0.0560	17	5.85%	221	0.0619
2	1.97%	74	0.0567	10	7.27%	275	0.0643	18	3.04%	115	0.0523
3	1.95%	73	0.0523	11	6.25%	236	0.0637	19	2.40%	91	0.0504
4	3.30%	125	0.0676	12	7.04%	266	0.0621	20	0.97%	37	0.0491
5	1.94%	73	0.0638	13	6.54%	247	0.0623	21	3.04%	115	0.0601
6	3.47%	131	0.0687	14	6.41%	242	0.0618	22	4.21%	159	0.0633
7	6.38%	241	0.0662	15	5.47%	207	0.0617	23	2.51%	95	0.0583
8	4.92%	186	0.0556	16	4.04%	153	0.0587	24	0.99%	37	0.0483
								Total		3,775	

1210 California Circle, Milpitas, CA
Interstate 880
PM2.5 & TOG Modeling - Roadway Links, Traffic Volumes, and PM2.5 Emissions
Year = 2025

Road Link	Description	Direction	No. Lanes	Link Length (m)	Link Width (ft)	Link Width (m)	Release Height (m)	ADT	Average Speed (mph)
NB-880	Northbound I-880	N	5	704	80	24.3	0.0	115,825	Variable
SB-880	Southbound I-880	S	6	701	92	27.9	0.0	115,825	Variable

2025 Hourly Traffic Volumes Per Direction and PM2.5 Emissions - NB-880

Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile
1	1.13%	1313	0.0268	9	7.10%	8221	0.0224	17	7.36%	8521	0.0233
2	0.39%	455	0.0301	10	4.35%	5043	0.0245	18	8.20%	9496	0.0226
3	0.33%	384	0.0309	11	4.64%	5369	0.0230	19	5.73%	6632	0.0205
4	0.25%	287	0.0526	12	5.88%	6812	0.0228	20	4.31%	4987	0.0203
5	0.48%	553	0.0288	13	6.17%	7143	0.0220	21	3.27%	3787	0.0215
6	0.89%	1031	0.0313	14	6.04%	6996	0.0222	22	3.31%	3838	0.0223
7	3.81%	4415	0.0236	15	7.05%	8161	0.0215	23	2.47%	2856	0.0216
8	7.83%	9066	0.0208	16	7.16%	8295	0.0209	24	1.87%	2164	0.0203
								Total		115,825	

2025 Hourly Traffic Volumes Per Direction and PM2.5 Emissions - SB-880

Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile
1	1.13%	1313	0.0268	9	7.10%	8221	0.0227	17	7.36%	8521	0.0214
2	0.39%	455	0.0301	10	4.35%	5043	0.0245	18	8.20%	9496	0.0206
3	0.33%	384	0.0309	11	4.64%	5369	0.0230	19	5.73%	6632	0.0205
4	0.25%	287	0.0526	12	5.88%	6812	0.0228	20	4.31%	4987	0.0203
5	0.48%	553	0.0288	13	6.17%	7143	0.0220	21	3.27%	3787	0.0215
6	0.89%	1031	0.0313	14	6.04%	6996	0.0222	22	3.31%	3838	0.0223
7	3.81%	4415	0.0236	15	7.05%	8161	0.0215	23	2.47%	2856	0.0216
8	7.83%	9066	0.0212	16	7.16%	8295	0.0209	24	1.87%	2164	0.0203
								Total		115,825	

CAL3QHCR Risk Modeling Parameters and Maximum Cancer Risk in Project Area
12112 California Circle, Milpitas, CA - DPM PM2.5 & TOG TACs
1.5 meter Receptor Heights

Receptor Information

Number of Receptors	134
Receptor Height =	1.5 meters
Receptor spacing =	variable

Meteorological Conditions

Alviso Hourly Met Data	1996 - 2000
Land Use Classification	urban
Wind speed =	variable
Wind direction =	variable

Cancer Risk Calculation Method

Inhalation Dose = C_{air} x DBR x A x EF x ED x 10^{-6} / AT

Where: C_{air} = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
AT = Averaging time period over which exposure is averaged.
10^{-6} = Conversion factor

Inhalation Dose Factors

	Value[1]							
Exposure Type	**DBR (L/kg BW-day)**	**A (-)**	**Exposure (hr/day)**	**Exposure (days/week)**	**Exposure (week/year)**	**EF (days/yr)**	**ED (Years)**	**AT (days)**
Residential (70-Year)	302	1	24	7	50	350	70	25,550

[1] Default values recommended by OEHHA& Bay Area Air Quality Management District

Cancer Risk (per million) = Inhalation Dose x CRAF x CPF x 10^6
= URF x Cair

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
CRAF = Cancer Risk Adjustment Factor [adjustment factors are dependent on emissions period and duration of exposure]
SWFi = Sensitivity weighting factor dependent on emissions period i and duration of exposure
URF =Unit risk factor (cancer risk per $\mu g/m^3$)

Unit Risk Factors (risk per million per $\mu g/m^3$) for DPM and Organic TACs from Vehicle TOG Exhaust & Evaporative Emissions

Exposure Type	**CPF $(mg/kg\text{-}day)^{-1}$**	**CRAF* (-)**	***DPM***	**Exhaust TOG TACs**	**Evaporative TOG TACs**
Residential (70-Yr Exposure)	1.10E+00	1	318.5	1.8	0.107

* Adjustment to cancer risks accounted for below using Age Sensitivity Weighting Factor for each emissions period modeled

MEI Cancer Risk Calculations - Receptor Height = 1.5 m

Meteorological Data Year	**Maximum DPM Concentration ($\mu g/m^3$) 2018**	**2020**	**2025**	**Maximum Exhaust TOG Concentration ($\mu g/m^3$) 2017**	**2020**	**2025**	**Maximum Evaporative TOG Concentration ($\mu g/m^3$) 2017**	**2020**	**2025**	**Maximum PM2.5 Concentration ($\mu g/m^3$) 2017**	**2020**	**2025**
1996	0.0167	0.0145	0.0131	0.2192	0.1775	0.1420	0.4542	0.4184	0.3692	0.1442	0.1443	0.1495
1997	0.0177	0.0153	0.0139	0.2346	0.1900	0.1466	0.4862	0.4480	0.3813	0.1544	0.1545	0.1544
1998	0.0186	0.0161	0.0146	0.2449	0.1983	0.1587	0.5075	0.4676	0.4126	0.1611	0.1612	0.1671
1999	0.0184	0.0184	0.0144	0.2504	0.2028	0.1624	0.5188	0.4782	0.4222	0.1647	0.1649	0.1709
2000	0.0171	0.0148	0.0134	0.2287	0.1852	0.1483	0.4740	0.4367	0.3855	0.1505	0.1506	0.1561
Average	0.0177	0.0158	0.0139	0.2356	0.1908	0.1516	0.4882	0.4498	0.3942	0.15	0.16	0.16
Unadjusted Cancer Risk[a]	5.64	5.03	4.42	0.43	0.35	0.27	0.05	0.05	0.04			
Age Sensitivity Weighting Factor	0.354	0.214	1.121	0.354	0.214	1.121	0.354	0.214	1.121			
Contribution to Total Cancer Risk	1.99	1.08	4.96	0.15	0.1	0.3	0.02	0.0	0.0			
70-yr Cumulative Risk[b]	8.03			0.53			0.08			**Average PM2.5 =**	**0.16**	

Total Risk From All TACs = 8.6 per million

Notes:

Maximum DPM & PM2.5 concentrations occur at the receptor adjacent to western boundary of residenitial area closest to Interstate 880

a Cancer risk (per million) calculated assuming constant 70-year exposure to concentration for year of analysis - without age sensitivity adjustments.

b Cumulative cancer risk (per million) calculated assuming variable exposure over a 70-year period due to decreased concentrations over time and incorporating age adjustment factors.